Variable definitions

$a_o := 0.529177249 \cdot 10^{-10} \cdot m$ $\quad fm := 10^{-15} \cdot m$ $\quad Å := 10^{-10} \cdot m$

$c := 299792458 \cdot \frac{m}{sec}$ $\quad ce := 1.602176462 \cdot 10^{-19} \cdot coul$ ce is abbreviation of absolute value of charge on electron

$\alpha := 7.297352533 \cdot 10^{-3}$ $\quad eV := ce \cdot volt$ $\quad me := 9.10938188 \cdot 10^{-31} \cdot kg$ me is electron mass

$h := 6.62606876 \cdot 10^{-34} \cdot joule \cdot sec$ $\quad amu := 1.6605402 \cdot 10^{-27} \cdot kg$

$mp := 1.6726231 \cdot 10^{-27} \cdot kg$ mp is proton mass

$\varepsilon := 8.854187817 \cdot 10^{-12} \cdot \frac{farad}{m}$ $\quad \mu_o := 4 \cdot \pi \cdot 10^{-7} \cdot \frac{newton}{amp^2}$ $\quad Hz := sec^{-1}$

$me := \frac{me \cdot mp}{me + mp}$ Reduced electron mass

The principal quantum number "p", used here, is 1/n, where n is the usual principal quantum number

Calculations

$\lambda = p \cdot 2 \cdot \pi \cdot r$ Lissajous (I)

$\lambda = \frac{h}{me \cdot v}$ De Broglie (II)

$\frac{me \cdot v^2}{r} = \frac{ce^2}{4 \cdot \pi \cdot \varepsilon \cdot r^2}$ Force balance (III)

$p \cdot 2 \cdot \pi \cdot r = \frac{h}{me \cdot v}$ Lissajous + De Broglie (IV)

solving for v => $v = \frac{h}{(2 \cdot \pi \cdot r \cdot me \cdot p)}$ (V)

Substitution of V in III and solving for r =>

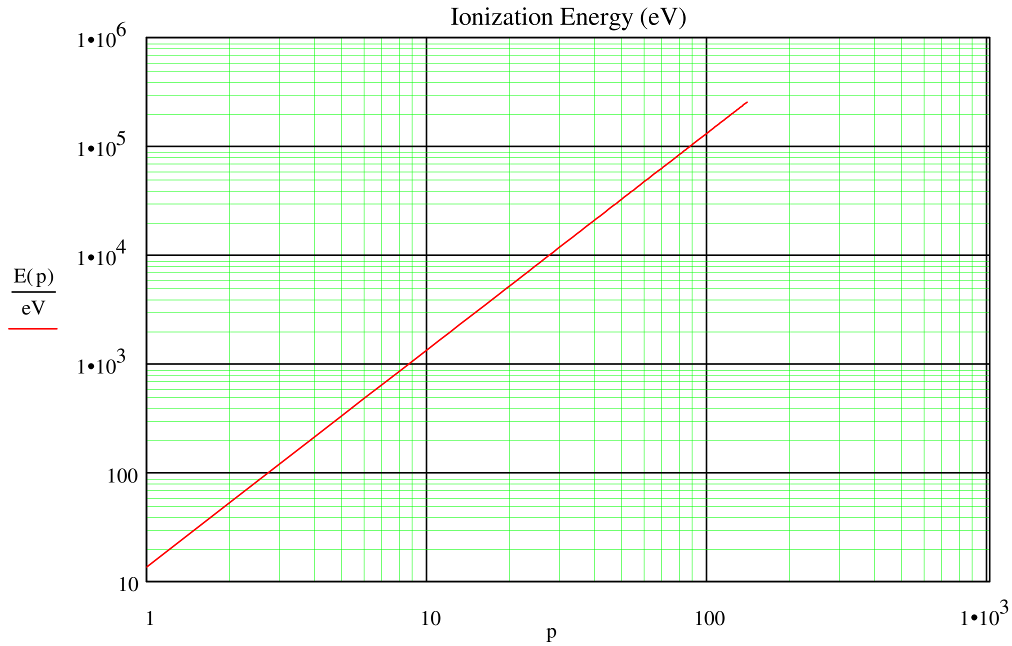
$r(p) := \frac{h^2 \cdot \varepsilon}{me \cdot \pi \cdot ce^2 \cdot p^2}$ This is Bohr radius / p^2 (VI)

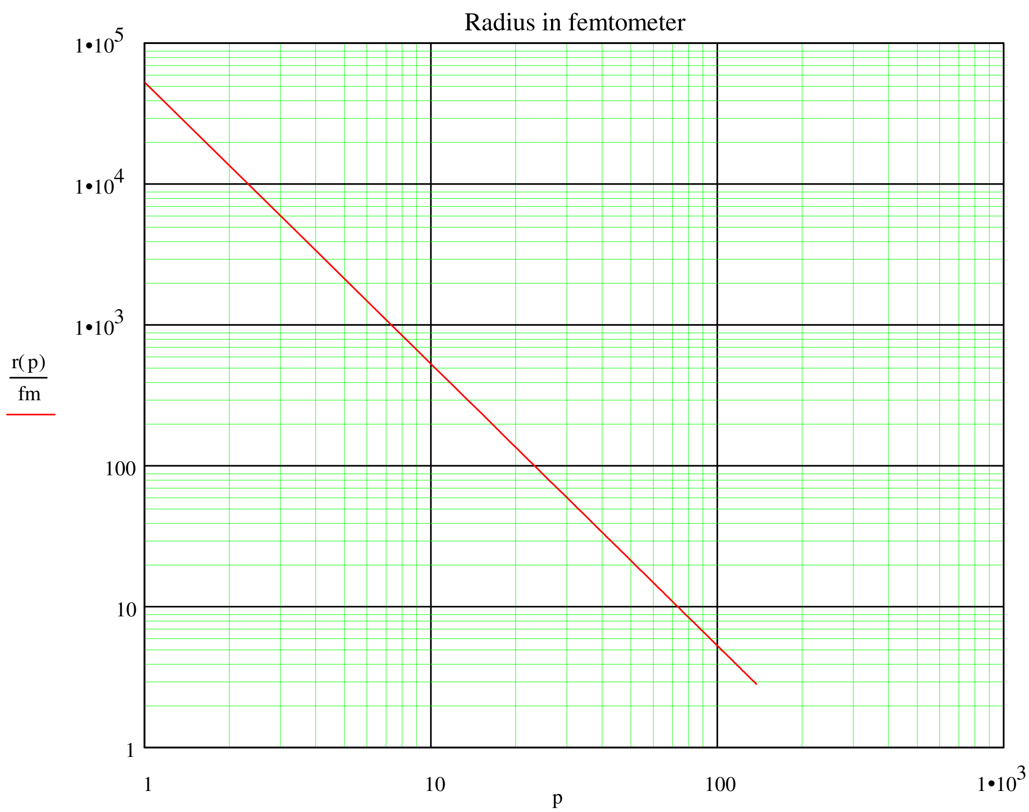
$E = \frac{ce^2}{4 \cdot \pi \cdot \varepsilon \cdot r} - \frac{1}{2} \cdot me \cdot v^2$ Ionization energy (VII)

Substitution of V and VI in VII =>

$E(p) := \frac{1}{8} \cdot \frac{ce^4}{\left(\varepsilon^2 \cdot h^2\right)} \cdot me \cdot p^2$ This is p^2 x ionization energy of "ground state" Hydrogen (VIII)

The angular momentum for each orbital is simply $\frac{h}{2 \cdot \pi \cdot p}$ $\quad p := 1, 2 .. 137$





$E_{Ionization_p} := E(p)$

$Radius_p := r(p)$

Number in shaded column is p

$E_{Ionization} =$ (eV)

p	0
0	0
1	13.598
2	54.393
3	122.385
4	217.573
5	339.957
6	489.538
7	666.316
8	870.29
9	1101.461
10	1359.829
11	1645.393
12	1958.153
13	2298.11
14	2665.264
15	3059.614

$Radius =$ (Å)

p	0
0	0
1	0.52947
2	0.13237
3	0.05883
4	0.03309
5	0.02118
6	0.01471
7	0.01081
8	0.00827
9	0.00654
10	0.00529
11	0.00438
12	0.00368
13	0.00313
14	0.0027
15	0.00235